

EVALUATION OF GAME FISH POPULATIONS IN INDIAN CREEK, GREENE AND LAWRENCE COUNTIES, 2004

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EXECUTIVE SUMMARY

- Indian Creek flows approximately 55 miles through four counties (Monroe, Lawrence, Greene and Martin) in south-west Indiana to its confluence with the East Fork of the White River near Shoals, Indiana.
- Indian Creek was part of a six year work plan (98759) to evaluate game fish populations in four Indiana streams throughout the state. A depletion method of population estimation was used biennially to estimate game fish per mile.
- The Qualitative Habitat Evaluation Index was used to assess fish habitat. All sample sites were found to have good habitat for game fish.
- Smallmouth bass population estimates ranged from a high of 446 fish/mile in 2002 to a low of 205 fish/mile in 2004. Rock bass populations ranged from a high of 562 fish/mile in 2004 to a low of 368 fish/mile in 2000. Spotted bass populations ranged from a high of 245 fish/mile in 2002 to a low of 145 fish/mile in 2004.
- The statewide 12 inch size limit for black bass, instated in 1998, does not appear to have affected the population of game fish at Indian Creek. The quality of black bass populations in Indian Creek appears to be more of a result of quality habitat and stable water conditions soon after the spring spawn.

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EVALUATION OF GAME FISH POPULATIONS IN INDIAN CREEK, GREENE AND LAWRENCE COUNTIES, 2004

INTRODUCTION

Indian Creek begins in southwestern Monroe County. From there, it flows approximately 55 miles through Greene, Lawrence, and Martin Counties to its confluence with the East Fork of the White River. Indian Creek and its tributaries drain approximately 172 square miles of south-central Indiana. The stream receives moderate fishing pressure, particularly in Greene and Lawrence Counties. Indian Creek is considered navigable for 15 river miles from its confluence with the East Fork of the White River to the Martin-Lawrence County line.

The fish population of Indian Creek in Lawrence County was sampled by Ball (1983) as part of a spear fishing study. Upper Indian Creek in Monroe and Greene Counties was sampled by Aquatic Ecosystems in 1990. The fish community at two sites in the 15-mile stretch of lower Indian Creek in Martin County was sampled in 1994 (Andrews 1995). Population estimates for major game fish species were conducted at four stations in 1998, 2000 and 2002 (Schoenung 1999, Sapp 2001, Schoenung 2002). A general fish community survey was conducted in 1999 at these same four stations (Sapp 2000). The current report includes population estimates of game species in the middle stretch of Indian Creek for 2004. The study is being conducted as part of work plan 98759 entitled "Evaluation of Game Fish Populations and Recreational Uses on Indiana Streams". The study was designed to evaluate the impacts of a statewide 12-inch minimum size limit for black bass in rivers and streams enacted in 1998.

Population estimates for game fish were conducted at four separate stations (Figure 1). River miles (RM) from the confluence of the White River identify sample stations. Stations have remained the same since initial sampling in 1998 with the exception of RM 38.2, which was shortened, and RM 27.8, which had to be moved upstream due to changes to the river channel. The 1998 survey was conducted in June and July. Statewide results concluded that this was too early for optimum catches of stream game species, in particular smallmouth bass. This report covers the population estimates that were conducted on August 23 to 25, 2004.

METHODS

Three stations were sampled in Greene County and one in Lawrence County. Sampling stations were chosen based on the quality of the habitat and ease of access. A reasonable length of stream was selected so that it could be sampled at least three times during the sampling day. Stations ranged from 622 to 1,320 ft in length and were located at RM 27.8, 32.7, 38.2, and 44.5. Stream conditions were considered to be at low to normal levels. Stream reaches were logged

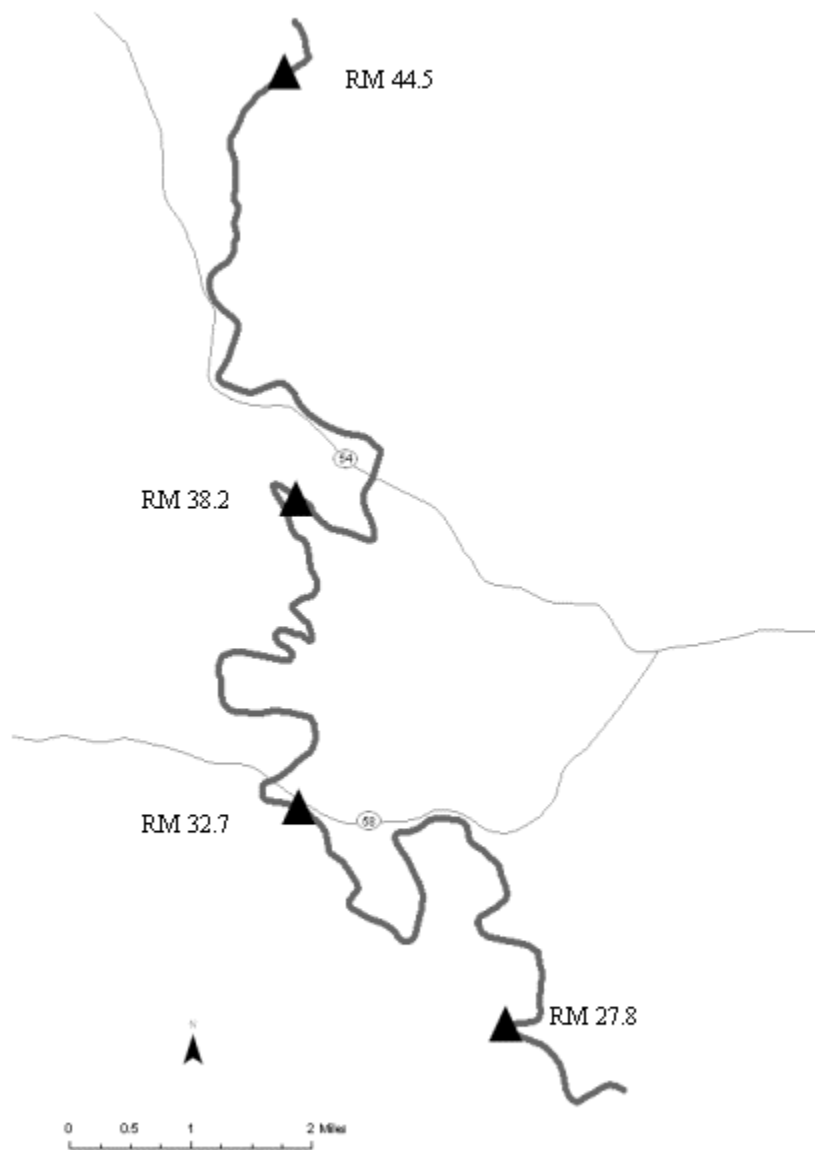


Figure 1. Indian Creek sample sites, Greene and Lawrence Counties 1998, 2000, 2002 and 2004.

using a global positioning system (G.P.S.). Latitude and longitude coordinates were taken for the start and end of each station. Block nets were placed at the upper end of each station to prevent escapement of fish. A natural barrier (shallow riffle) at the lower end of each station was chosen to prevent fish from leaving the site. Fish were collected using a pulsed DC barge electrofisher with a crew of two dippers and one barge operator. During all sampling, game fish were collected, identified, measured to the nearest 0.1 inch, and weighed to the nearest 0.01 pound. Scale samples were collected for age and growth analysis. In order to document movement of game fish throughout the study, all game fish collected were marked using a fin clip unique to each station. A right ventral clip was used at RM 44.5, a right pectoral clip was used at RM 38.2, a left ventral clip was used at RM 32.7 and left pectoral was used at RM 27.8.

Population estimates were obtained by using the removal method. MicroFish 3.0 (Van Deventer and Platts 1989), a software program for generating population statistics from electrofishing data, was used to create population estimates. This program calculates the population estimate based on a descending removal pattern. Sampling that does not exhibit a descending removal pattern results in an extremely high standard error. Sampling was repeated as necessary to ensure a low standard error.

RESULTS

Rock bass

A total of 378 rock bass was collected with a total weight of 43.81 pounds. Rock bass ranged in length from 1.0 to 9.0 inches and averaged 5.1 inches. Growth for rock bass was below average for all ages when compared to rock bass collected in the Interior Plateau (Shipman 1997)(Table 1). The proportional stock density (PSD) or the number of stock size rock bass divided by the number of quality size rock bass was 27. The relative stock density of 8.0 inch and larger fish (RSD8) was 6. In the 2002 survey, PSD was 32 and RSD8 was 9. In 2000, the PSD was 33 and RSD8 was 6 (Anderson and Neumann 1996).

Population estimates for rock bass were calculated in fish per mile. River mile 38.2 had the highest estimate of 740 fish per mile, while RM 32.7 had the lowest of 425 fish per mile. Average for the entire reach sampled was 562 rock bass per mile. This estimate was the highest since the beginning of the project. Population estimates were 446 fish per mile in 1998, 368 fish per mile in 2000 and 469 fish per mile in 2002 (Appendix).

One rock bass was collected at RM 38.2 with a fin clip. The left ventral fin clip indicated this fish was from RM 32.7.

Table 1. Rock bass back-calculated average length (inches) at each age for Indian Creek, 1998, 2000, 2002 and 2004 (Interior Plateau Ecoregion average listed for comparison).

Year	Length at age						
	1	2	3	4	5	6	7
2004	1.9	3.0	4.4	5.6	6.5	7.2	7.6
2002	1.8	2.8	4.1	5.5	6.8	7.5	8.5
2000	0.9	2.0	3.2	4.5	6.1	7.5	
1998	1.8	2.8	4.1	5.5	6.6	7.2	7.8
Interior Plateau	2.0	3.4	5.2	6.7	7.4	7.7	

Smallmouth bass

There were 153 smallmouth bass collected with a total weight of 49.68 pounds. Smallmouth bass ranged in length from 1.7 to 17.0 inches. Eleven percent of the fish collected were 12 inches and greater. Growth was below average when compared to smallmouth in the Interior Plateau (Table 2). Smallmouth bass had a PSD of 34 and an RSD12 of 19. The RSD12 was 18 in 2002 and 34 in 2000. In 2004, smallmouth bass population estimates were lower than the past surveys with the exception of the 1998 survey. The average of all stations was 206 fish per mile. RM 27.8 had the highest estimate of 236 fish per mile. This station has consistently had the highest catch for all sample years. RM 32.7 had the lowest estimate for smallmouth at 187 fish per mile.

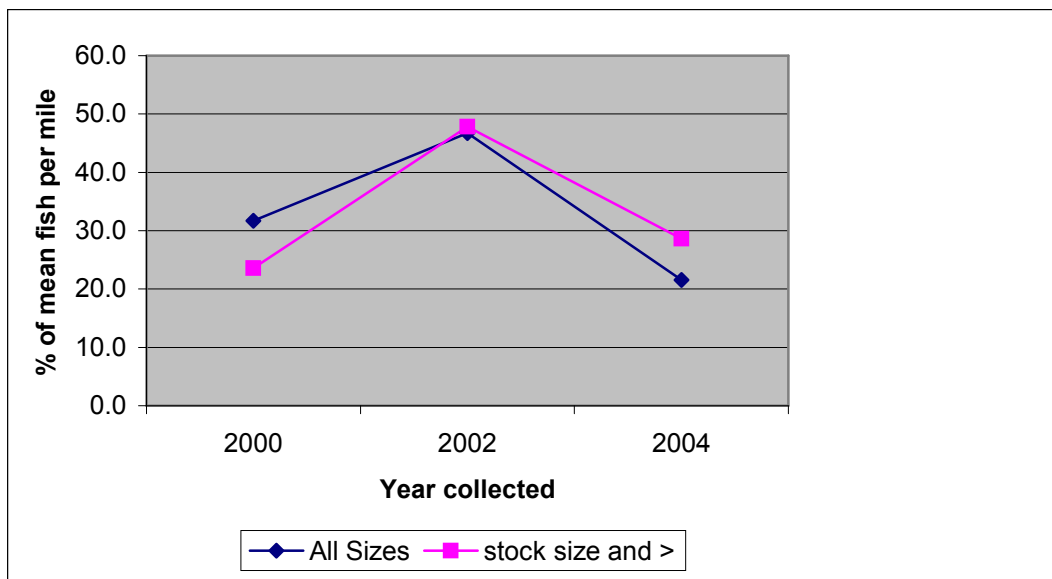
Table 2. Smallmouth bass back-calculated average length (inches) at each age for Indian Creek, 1998, 2000, 2002 and 2004 (Interior Plateau Eco-region average listed for comparison).

Year	Length at age					
	1	2	3	4	5	6
2004	3.5	5.9	8.3	10.2	11.6	
2002	3.6	6.4	8.9	11.2	12.4	
2000	3.4	6.2	8.2	10.1	11.6	13.0
1998	3.2	5.7	8.1	9.9	11.7	
Interior Plateau	4.0	6.5	8.9	10.6	13.0	15.0

Three bass were collected with fin clips from previous sample years. One bass at RM 38.2 had two clips indicating the fish was caught once at RM 38.2 and once 5 miles downstream at RM 32.7. The other two bass collected were found at RM 44.5. They had identical clips indicating both had migrated approximately 17 miles from RM 27.8.

In 2002, young of the year (YOY) smallmouth accounted for the bulk of the increase in population estimates (Schoenung 2002). In order to determine if the size limit was protecting bass from harvest and to eliminate the YOY bias, the population estimates were recalculated to include only stock size smallmouth bass. There was no appreciable difference in relative average population estimates by year. (Figure 2). The 2002-year class now makes up the highest percentage (37.4%) of smallmouth collected in the 2004 estimate.

Figure 2. A comparison of percent mean fish per mile of stock size and greater smallmouth bass to all sizes of smallmouth bass, 2000, 2002 and 2004.



Spotted bass

There were 66 spotted bass collected with a total weight of 10.81 pounds. Length range was 2.1 to 13.3 inches. Growth was below average when compared to the spotted bass in the Interior Plateau stream region (Table 3).

Table 3. Spotted bass back-calculated average length (inches) at each age for Indian Creek, 1998, 2000, 2002 and 2004 (Interior Plateau Ecoregion average listed for comparison).

Year	Length at age			
	1	2	3	4
2004	2.5	5.3	7.5	
2002	2.8	6.6	8.0	
2000	2.8	5.5	8.7	
1998	2.3	4.7	7.1	8.9
Interior Plateau	3.0	6.1	8.5	10.7

Spotted bass population estimates averaged 145 fish per mile. This is the lowest estimate since 1998. Population estimates were 116 fish per mile in 1998, 153 fish per mile in 2000 and 245 fish per mile in 2002. RM 38.2 had the highest estimate at 241 fish per mile while RM 44.5 had the lowest at 56 fish per mile.

Spotted bass are protected under the black bass stream size limit of 12 inches. Only one fish collected was over the legal size of 12 inches. PSD size structure was also the lowest since the beginning of the project. The PSD was 8 and RSD12 was 4. In 2002, PSD and RSD12 were both 8 and in 2000 PSD was 19 and RSD12 was 12.

DISCUSSION

Qualitative Habitat Evaluation Index (QHEI) assessment of Indian Creek in the early part of this study ranged from 70 to 77. An index of 60 and above is considered good habitat (Shipman 1997). Population estimates and the resulting length frequency data all indicate Indian Creek provides excellent fishing opportunities for rock bass, smallmouth bass and spotted bass. The 1998 implementation of the black bass stream size limit of 12 inches was designed to create a higher quality fishery by increasing numbers and size of black bass. Two of the four sample sites (RM 27.8 and RM 32.7) are accessible to the public. River mile 27.8 consistently had the highest smallmouth population estimate throughout the study indicating the angling pressure is having little effect on the smallmouth bass population. Growth remained below average for all game species collected throughout the study. Sapp (2000) noted that the Interior Plateau growth averages were derived from a database of streams greater than 100 CFS. For all but one station,

average flows at the sample sites were well below 100 CFS. Indian Creek smallmouth bass reach 12-inches between ages 4 and 6.

The variable smallmouth recruitment in Indian Creek is driven by spring weather conditions and the resulting water levels. Low or stable water conditions after the spawn generally will result in a successful year class of fish. The closest United States Gage Station (USGS) to Indian Creek is downstream of the confluence with the East Fork of the White River. USGS stream information for the East Fork of the White River document below average water levels for the month of April 1995 (USGS). In 1996 and 1997, water levels were well above the 100-year average for the months of April and May. This corresponds to poor year classes for those years. The 1998 age and growth data indicated strong year classes in 1994 and 1995. Strong year classes these years resulted in a RSD12 in 2000 of 34. RSD 12 for 2002 and 2004 dropped to 18 as a result of poor recruitment after the 1995 year class. However, in 2002 when the bulk of the catch was YOY, there was record high rainfall for March through August. The constant high water levels throughout the spring and summer may not have been as detrimental as the flash flood situations in 1996 and 1997. All game species studied in this project had strong year classes in 2002. Given the current growth of smallmouth bass, these fish should reach harvestable size by 2005.

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Fish per mile population estimates for Indian Creek by station and average fish per mile, 2000, 2002 and 2004.

Smallmouth bass						Average
Year	RM 44.5	RM 38.2	RM 32.7	RM 27.8	Total	Fish/mile
2000	214	315	265	417	1211	302.8
2002	346	475	422	541	1784	446.0
2004	189	210	187	236	822	205.5
Project Average						318.1

Spotted bass						
Year	RM 44.5	RM 38.2	RM 32.7	RM 27.8	Total	
2000	77	185	116	234	612	153.0
2002	38	245	320	382	985	246.3
2004	56	241	76	208	581	145.3
Project Average						181.5

Rock bass						
Year	RM 44.5	RM 38.2	RM 32.7	RM 27.8	Total	
2000	522	272	236	442	1472	368.0
2002	432	272	344	829	1877	469.3
2004	492	740	425	592	2249	562.3
Project Average						466.5